REVIEWS

SUMMARIES OF RECENT NORTH AMERICAN PRE-CAMBRIAN LITERATURE

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EDWARD B. MATHEWS. "The Structure of the Piedmont Plateau as Shown in Maryland." *American Journal of Science*, 4th Ser., Vol. XVII (1904), pp. 141–59.

Mathews discusses the structure of the Piedmont Plateau. The Baltimore gneiss (William's biotite gneiss in part) is correlated with the Fordham gneiss of New York, the Arrowmink arkosic gneiss of Philadelphia, the Carolina gneiss (in part) of the Washington area, all of which are referred to the pre-Cambrian. He concludes:

1. The older rocks of the Piedmont consist of both sedimentary and igneous types, which since their formation have been more or less metamorphosed.

2. The metamorphosed sediments include banded micaceous and hornblende gneisses of pre-Cambrian age; a more or less intermittent, thin-bedded, generally tourmaline-bearing quartzite of Cambrian age; an intermittent dolomitic marble or magnesian limestone of Cambro-Ordovician age; and a series of mica-schists and the gneisses of Ordovician age. Above these occur a somewhat intermittent, poorly developed quartzitic conglomerate and the Peach Bottom slates.

3. The igneous rocks consist of an immense gabbro sheet, intruded by numerous large bodies of granite and meta-rhyolite, and accompanied by numerous more basic serpentinized bodies. These various masses represent stages in a single extended period of igneous activity.

4. The time when this activity took place was later than early Silurian and earlier than the late Carboniferous; probably in the early part of this interval.

5. The chief structural features of the region are the metamorphism and constant schistosity, and the broader folding of the different rocks.

6. The metamorphism of the rocks, especially of the banded gneisses, probably commenced prior to the intrusion of the gabbro and granite, and was accentuated by them in the eastern portion of the Plateau.

7. The folding of the region is of the Appalachian type, the rocks occurring in several long, more or less parallel, folds, with few faults and but occasional overturned folds.

8. The eastern and western areas are probably of the same age; differences in metamorphism being due to the large bodies of deep-seated intrusives on the east and the smaller bodies of surface volcanics on the west.

9. The sequence found in Maryland may be recognized from Washington to Trenton and in the region north of New York.

A. A. JULIEN. "Genesis of the Amphibole Schists and Serpentines of Manhattan Island, New York." *Bulletin of the Geological Society of America*, Vol. XIV (1903), pp. 421–94.

Julien discusses the genesis of the amphibole schists and serpentines of Manhattan Island, New York (including the Manhattan and Fordham series), and concludes that they are derived from the alteration of basic igneous rocks. This appears established by the correspondence of the hornblende rock in chemical composition to basic igneous rocks and to hornblende schists of that derivation, by identity of its hornblende constituent with that found in volcanic rocks, by the discovery of many apophyses, isolated or in groups, and other structural features, and by the survival of products of contact alteration. The absence of pyroxene and of dike-like intersection of the associated gneisses may be well explained by the extent of shearing and metamorphism.

T. L. WATSON. "Granites of North Carolina." *Journal of Geology*, Vol. XII (1904), pp. 373–407.

Watson maps and petrographically describes the granites of North Carolina.

WILLIAM H. HOBBS. "The Geological Structure of the Southwestern New England Region." *American Journal of Science*, Vol. XV (1903), pp. 437–49.

"Lineaments of the Atlantic Border Region." *Bulletin of the Geological Society of America*, Vol. XV (1904), pp. 483–506.

Hobbs concludes that the crystalline rocks of southwestern New England have been deformed by a system of joints and faults of post-Newark age superimposed upon older structures which appear to be largely due to folding. He concludes further, that the crystalline and later rocks of the Atlantic coast in general show lineaments suggesting regular sets of faults in a nearly meridional series and in two other series which make nearly equal angles with this direction. Other lineaments which more closely approach the equatorial direction vary more from one another, and are both numerically less important and less strikingly brought out.

CHARLES R. VAN HISE. "A Treatise on Metamorphism." *Monograph No. 47*, U. S. Geological Survey, 1904. Pp. 1,286.

Van Hise discusses principles of metamorphism applicable to the study of pre-Cambrian and other metamorphic rocks, and cites many illustrative pre-Cambrian rocks and localities.

W. S. BAYLEY. "The Menominee Iron-Bearing District of Michigan." *Monograph No. 46*, U. S. Geological Survey, 1904. Pp. 513.

CHARLES R. VAN HISE AND W. S. BAYLEY. "The Menominee Special Folio." *Geologic Atlas of the United States*, Folio No. 62, U. S. Geological Survey, 1900.

Journal of Geology, Vol. IX (1901), pp. 451–54.

Bayley and Van Hise describe and map the geology of the Menominee iron-bearing district of Michigan. The essential facts are covered in a preliminary report summarized in a former number of this *Journal*. An additional feature of interest is the discovery of minute granules in the Menominee iron formation similar to the greenalite granules from which the Mesabi ores are largely derived.

Comment.—The age of the Quinnesec schists cannot be regarded as finally settled.

They have been assigned to the Archean because of lithological characteristics, but the contact between them and the Lower Huronian sediments to the north is covered by Upper Huronian and glacial deposits. Greenstones to the west on the Brulé River, similar to the Quinnesec schists, are closely infolded, and perhaps interbedded with slates which have been mapped as Upper Huronian. In view of these facts, it is quite possible that the Quinnesec schists are as late as Upper Huronian, thus corresponding to the Clarksburg volcanics of the Marquette district.

On the basis of the triple division of the Huronian series which has been adopted since the discovery of an unconformity in the previously called Lower Huronian series of the Marquette district, the Upper and Lower Huronian series are represented in the Menominee district, and not the Middle Huronian, unless we except certain pebbles taken to represent the Negaunee formation. It is still possible that the iron formation mapped as Upper Huronian may in reality be Middle Huronian, as suggested by partly hypothetical structural connection with formations mapped as Middle Huronian to the north, but in this case there should be found an unconformity between the iron formation and the slates above, and none has yet been found, although the field has been most carefully examined.

S. WEIDMAN. "The Baraboo Iron-Bearing District of Wisconsin." *Bulletin XIII*, Wisconsin Geological and Natural History Survey, 1904. Pp. 190, with map.

Weidman describes and maps the Baraboo quartzite region of south-central Wisconsin.

A pre-Cambrian quartzite formation, having an estimated thickness of 3,000–5,000 feet, forms an east-and-west synclinorium about 20 miles long, and ranging in width from 2 miles on the east to 10 or 12 miles on the west, resting on a basement of igneous rock consisting of granite, rhyolite, and diorite, in isolated and widely separated areas both north and south of the quartzite synclinorium. The largest area is one of rhyolite near the lower narrows of the Baraboo. The upturned north and south edges of the quartzite form respectively the North and South Ranges of the Baraboo Bluffs, standing 700–800 feet above the surrounding country and above the intervening valley. In the valley are pre-Cambrian formations younger than, and conformable with, the quartzite. These are the Seeley slate, having an estimated thickness of 500–800 feet, and above this the Freedom formation, mainly dolomite, having a thickness estimated to be at least 800 feet, bearing iron-ore deposits in its lower horizon.

Flat-lying Paleozoic sediments, unconformably overlying the pre-Cambrian rocks, occupy the surrounding area and partly fill the valley. The Paleozoic rocks range from Upper Cambrian, Potsdam, in the valley bottom to the Lower Silurian, Trenton, on the upper portions of the quartzite ranges. The Potsdam sandstone has a thickness ranging from a few feet to a maximum of about 570 feet in the valley. Glacial drift is abundant over the quartzite ranges and in the valley in the eastern half of the district, but occurs only in the valleys in the western half.

The iron ore is mainly a Bessemer hematite with soft and earthy, hard and black, and banded siliceous phases. A very small amount of hydrated hematite or limonite is also present. The rocks immediately associated with the ore and into which the ore grades are dolomite, cherty ferruginous dolomite, ferruginous chert, ferruginous

slate, and ferruginous dolomite slate—in fact, all possible graduations and mixtures of the minerals dolomite, hematite, quartz, and such argillaceous minerals as kaolin and chlorite. In the ferruginous rocks associated with the iron ore the iron occurs as hematite and also in the form of carbonate, isomorphous with carbonate of calcium, magnesium, and manganese in the form of ferro-dolomite and manganic-ferro-dolomite, and as silicates combined with various proportions of alumina, lime, magnesia, and manganese, as chlorite and mica, and also very probably to a small extent as iron phosphate.

It is believed that the iron ore of the Baraboo district was originally a deposit of ferric hydrate, or limonite, formed in comparatively stagnant, shallow water, under conditions similar to those existing where bog or lake ores are being formed today, and that through subsequent changes, long after the iron was deposited as limonite, while the formation was deeply buried below the surface and subjected to heat and pressure, the original limonite became to a large extent dehydrated and changed to hematite.

Comment.—The theory of the origin of the ores here proposed differs from that worked out for the Lake Superior region. It is believed that insufficient data are yet at hand to warrant a positive statement concerning the origin of the ores, and that until such data are at hand the theory worked out for the Lake Superior region in general, with which the Baraboo district has many points in common, should be assumed to apply to the Baraboo district. A detailed analysis and criticism of Dr. Weidman's argument is published by the reviewer in Vol. XXXV of the *Transactions of the American Institute of Mining Engineers.*

Drilling in the east-central portion of the valley has recently seemed to show the presence of an Upper Huronian quartzite series unconformably overlying the series described by Weidman, but this is yet to be confirmed.

JAMES M. BELL. "Economic Resources of Moose River Basin." *Report of the Ontario Bureau of Mines*, Part I (1904), pp. 135–97.

Bell describes the Laurentian and Huronian rocks of the Moose River basin. The former include acid igneous rocks, and the latter, greenstones, green schists, and certain sediments, with doubtful relations to each other and to the Laurentian.

GEORGE F. KAY. "The Abitibi Region." *Report of the Ontario Bureau of Mines*, Part I (1904), pp. 104–34.

Kay describes the rocks seen on a trip from Mattagami to Nighthawk and the area west of Lake Abitibi. No attempt is made to describe their stratigraphy and structure.

A. P. COLEMAN. "The Classification of the Archean." *Proceedings and Transactions of the Royal Society of Canada*, Vol. VIII (2d Ser., 1902), Sec. IV, pp. 135–48.

Coleman discusses the classification of the Archean (pre-Cambrian of the U. S. Geological Survey), and proposes the following:

Middle and Lower Cambrian? or Algonkian?	Keweenawan
	(Unconformity)
	Animikie

EPARCHEAN INTERVAL

Archean { Laurentian = Fundamental gneiss, etc.
(Eruptive unconformity)
Huronian { Upper Huronian or Huronian proper
(Unconformity)
Lower Huronian or Keewatin { Schistose pyroclastics and eruptives
Coutchiching } } = Grenvile and Hastings series }

A. B. WILLMOTT. "The Contact of the Archean and Post-Archean in the Region of the Great Lakes." *Journal of Geology*, Vol. XII (1904), pp. 40–42.

Willmott finds a step-like regularity in the contact of the Archean (pre-Cambrian of the U. S. Geological Survey) and the post-Archean rocks in the region of the Great Lakes, and believes it to be explained by a dislocation in the Archean before the deposition of the post-Archean sediments.

A. P. COLEMAN. "The Northern Nickel Range." *Report of the Ontario Bureau of Mines*, Part I (1904), pp. 192–224. With geological map.

Coleman describes and maps the northern nickel range of the Sudbury district of Ontario. It constitutes the northern upturned edge of a synclinal of eruptive rocks resting on Laurentian granites and gneisses, and including within it a little-disturbed basin of Cambrian or Upper Huronian sediments and tuffs. The contact with the rocks both above and below are eruptive. The eruptive grades from acid in its inner margin to basic in its outer or lower margin. The nickel is concentrated or upper in its basic edge.

A. P. Low. "Report on an Exploration of the East Coast of Hudson Bay." *Annual Report of the Geological Survey of Canada*, Vol. XIII (New Ser., 1900), Part D. With geological map.

Low describes and maps the geology of the east coast of Hudson Bay. With the exception of the rocks which form the chains of islands along shore between Portland promontory and Cape Jones, and also a narrow margin on part of the coast in the same region, they have all been cut by granite which has not only intimately penetrated them, but by its heat and pressure has so changed them to crystalline schists and gneisses that only in a few places can any trace of an original sedimentary origin be found. The unaltered sedimentary rocks with their associated sheets of trap and diabase bear a remarkably close resemblance not only to the so-called Cambrian rocks of other parts of the Labrador peninsula, but also to the iron-bearing rocks of the southern shores of Lake Superior and the Animikie and Nipigon rocks to the north of Lake Superior. In all likelihood they are of pre-Cambrian age and, in the opinion of the writer, are the oldest known sedimentary rocks of Canada. Notwithstanding this opinion, they will continue to be classed as Cambrian in order to correspond with the areas of similar rocks of Labrador which have already been so classed. The series comprises from the base up: Coarse arkose, banded arkose, sandstone and graywacke, chert, impregnated with oxide of iron and red jasper, cherty carbonate, carbonaceous shales, sandstone. Included in this series are sheets or laccolites of dark-green trap. This rock also flowed out to the surface. The basement rock from which this series is derived has not been recognized in the region under discussion.

J. E. TODD. "The Newly Discovered Rock at Sioux Falls, South Dakota." *American Geologist*, Vol. XXXIII (1904), pp. 35–39.

Todd reports the presence of gabbro within one-half mile of the Sioux quartzite of South Dakota. He believes it to be intrusive into the quartzite, although no contacts are found.

E. R. BUCKLEY AND H. A. BUEHLER. "Quarrying Industry of Missouri." *Missouri Bureau of Geology and Mines*, Vol. II (2d Ser., 1904). With geological map.

Buckley and Buehler map and describe the pre-Cambrian granites of southeastern Missouri in connection with a report on the building-stones of the state.

J. D. IRVING. "Economic Resources of the Northern Black Hills." Part I, "General Geology" by T. A. JAGGAR, JR., *Professional Paper No. 26*, U. S. Geological Survey, 1904, pp. 13–41. With geological map.

Jaggar describes the general geology of the Black Hills and gives particular attention to the dynamics of the later intrusions of the northern part of the uplift. The southern portion was occupied by massive ancient pegmatite granites, themselves pre-Cambrian intrusives in Algonkian strata. Probably they acted as a rigid cementing and hardening agent to prevent fracturing in the southern schists; the northern, less indurated phyllites cracked and faulted more readily to permit the younger intrusives to rise from the depths. The northern exposed schist areas contain many hundred dikes and some stocks; these must have induced movements of horizontal extension in the schist, and such movements are attested by bedding-plane faults at the base of the Cambrian. The dikes have a common trend and dip parallel with schistosity. The dip gave them tendency to spread in the Cambrian in one direction more readily than in another.

Two illustrative sections are given. North of the Homestake mine on Deadwood Creek, near Central, Algonkian rocks appear as follows from west to east: graphitic schist, mica-schist, heavy ferruginous black schist with quartzite bands cut by irregular white quartz bodies which form a distinct zone, ferruginous schist, mica-schist, all dipping toward the east; mica-schist with thin sandstone stringers, dipping to the west. This sudden change of dip just opposite the De Smit and Homestake ore bodies is significant, and suggests that perhaps the great ore body may fill a synclinal saddle pitching to the southeast.

A section from north-northwest to south-southeast along the ridge northeast of the Clover Leaf mine is: garnetiferous mica-schist, graphitic schist, ferruginous quartzite, amphibolite, mica-schist, white quartz, mica-schist, amphibolite, quartzite, and amphibolite.

JOSEPH A. TAFF. "Preliminary Report on the Geology of the Arbuckle and Wichita Mountains in Indian Territory and Oklahoma." *Professional Paper No. 31*, U. S. Geological Survey, 1904. With geological map. See also *Geologic Atlas of the United States*, Folio No. 98, U. S. Geological Survey, 1903.

Taff describes and maps the geology of the Arbuckle and Wichita Mountains in Indian Territory and Oklahoma. In the Arbuckle Mountains, unconformably below middle-Cambrian sediments, are granite, granite-porphyry, and aporhyolite containing basic dikes. The granite (Tishimingo) occurs in the eastern part of the mountains in

a rudely triangular area twenty miles in length and ten miles wide in its widest part, near the western end. The porphyry and aporhyolite areas occur in the Arbuckle Mountains proper in the western end of the uplift.

In the Wichita Mountains pre-Cambrian granite, granite-porphyry, and gabbro cut by diabase form a considerable part of the mountains. Granite is the principal mountain-making rock in the Wichita region. Its area is greater than that of all the other igneous rocks combined, and is about equal to that of the others and the older Paleozoic sediments. It makes all of the high land of the Wichita, Quana, Devil's Canyon, and Headquarters Mountains, and a large part of the Raggedy group.

The gabbro is exposed for the most part in the valleys or on the plains which surround the mountains. The granite porphyry comprises practically all of the Carlton Mountains, the igneous mass lying between the limestone hills in the vicinity of Blue Canyon, north of Mount Scott, and some hills near the northwest end of the limestone areas east of Rainy Mountain Mission.

ERNEST HOWE. "An Occurrence of Greenstone Schists in the San Juan Mountains, Colorado." *Journal of Geology*, Vol. XII (1904), pp. 501–9.

Howe describes green schists in the pre-Cambrian of the Needle Mountains in San Juan and La Plata Counties of southwestern Colorado. They comprise massive and schistose, granular and porphyritic meta-gabbro, and areas of mashed granitic intrusives and other schistose rocks, presumably altered quartzites. No evidence of surface origin is noted in the igneous rocks. The greenstones antedate the Algonkian sediments to the north, as shown by the pebbles contained in the Algonkian conglomerate, and have an older aspect than the other rocks of the neighboring areas. They are therefore assigned to the early Algonkian. Attention is called to their similarity to the greenstones of the Menominee and Marquette districts of Michigan and to rocks near Salida, Colo.

ARTHUR C. SPENCER. "The Copper Deposits of the Encampment District, Wyoming." *Professional Paper No. 25*, U. S. Geological Survey, 1904.

Spencer discusses the geology of the Encampment district of Wyoming. Pre-Cambrian rocks form the main mass of the Sierra Madre Mountains with Mesozoic beds dipping away from them. They comprise sedimentary and igneous rocks. The sedimentary rocks are from the base up: hornblende schists, derived from surface volcanic rocks, interbedded with thin but persistent beds of sandy shale and impure limestone, limestone, quartzite, slate, and conglomerate. In the Encampment area the quartzite and slate formation is more in evidence than any other of the bedded rocks, but all occur in a limited area having the form of a narrow triangle, with its apex on the Encampment River about 5 miles south of Encampment, and its base, about 7 miles wide, in the foothills on the west side of the range. The belt of quartzites and associated strata is exposed for about 20 miles, but on the west their extent is not known, since they are overlapped by younger formations. The rocks within the sedimentary belt strike in general nearly east and west, and they seem at first sight to have an enormous thickness, since they dip almost invariably toward the south. An examination shows the sediments to be in an east-and-west synclinorium with axial planes of both major and minor folds dipping to the south. Strike faults and transverse faults are common.

A complex of igneous rocks comprising granite, quartz diorite, and gabbro, occur both to the north and south of the synclinorium, and the gabbro occurs also within the

synclinorium. The relations of the granite and quartz-diorite to the sediments are not definitely known, but their distribution is such as to suggest that they are intrusive into the hornblende schists at the base of the sedimentary series, and that with the hornblende schists they form the basement upon which the sedimentary rocks were deposited. The gabbro is intrusive into the sediments.

Comment.—The description indicates that the basal rock of this region, the hornblende schist, is similar in essential features to the schistose volcanic rocks with associated sediments making up the Keewatin series, the lowest in the Lake Superior region.

WALDEMAR LINDGREN. "A Geological Reconnaissance Across the Bitterroot Range and Clearwater Mountains in Montana and Idaho." *Professional Paper No. 27*, U. S. Geological Survey, 1904. With geological map.

Lindgren makes a geological reconnaissance across the Bitterroot Range and Clearwater Mountains in Montana and Idaho. Practically the entire area of the Bitterroot and Clearwater Mountains is occupied by granite with some gneiss. West of the Clearwater River, and only imperfectly exposed below the lava, is an extensive sedimentary area adjoining this granite; smaller sedimentary areas are exposed on Lolo Fork and on the head of the South Fork of Bitterroot River. In no place have well-defined fossils been found, but there is some foundation for the belief that the two last-named areas on the east side are very old, possibly pre-Cambrian, while the western area probably includes Triassic, Carboniferous, and possibly still older sediments. The granite constitutes a great bathylith whose age is not certain, but probably of post-Triassic age. The gneisses include older gneisses of the Clearwater Mountains, probably of pre-Cambrian age, and later gneisses resulting from the deformation of the granite occurring principally on the eastern side of the Bitterroot Mountains. On the accompanying map all are colored together as pre-Tertiary.

F. L. RANSOME. "The Geology and Ore Deposits of the Bisbee Quadrangle" *Professional Paper No. 21*, U. S. Geological Survey, 1904. "Geology of the Globe Copper District, Arizona." *Professional Paper No. 12*, U. S. Geological Survey, 1903. "Description of the Globe Quadrangle." *Geologic Atlas of the United States*, Folio No. 111, 1904. "Description of the Bisbee Quadrangle." *Geologic Atlas of the United States*, Folio No. 112, 1904.

Ransome describes in the Pinal Mountains of the Globe district of Arizona mica-schists with occasional bands of amphibole-schists which he calls the Pinal schists. These are intruded by quartz, mica-diorite, and granite. The schists and intrusives are unconformably below a non-fossiliferous series supposedly of pre-Cambrian age. The schists are believed to represent metamorphosed arkoses or grits. They are probably to be correlated with the Vishnu series of the Grand Canyon, provisionally called Algonkian by Walcott. In the absence of other criteria the Pinal schists are referred to the pre-Cambrian.

In the Mule Mountains of the Bisbee district, 90 miles to the south, are similar schists, also called Pinal schists.[1] Evidence of sedimentary origin is less satisfactory then in the Globe district and pre-Cambrian granitic intrusives are absent. Here also they are referred to the pre-Cambrian.

[1] The Pinal schists probably correspond to the Arizonian schists of Blake, *Engineering and Mining Journal*, Vol. XXXV (1883), pp. 238, 239.

A Geological Reconnaissance Across the Bitterroot Range and Clearwater Mountains in Montana and Idaho. By WALDEMAR LINDGREN. (Professional Paper No. 27, U. S. Geological Survey, 1904.) Pp. 122, XV plates, and 8 figures.

The area embraced in Mr. Lindgren's reconnaissance contains about 12,000 square miles, of which 6,000 are included in the Bitterroot Forest Reserve. It lies between the 113th and 117th meridians and between the parallels of 45° and 47°. Roughly speaking, one-fifth of the area is in western Montana, and the remainder extends across Idaho to the Washington boundary. The whole area lies in the watershed of the Columbia River. The Snake River is the largest stream which has its source in the region.

From east to west the characteristic topographic features are, in order, the following: (1) the Bitterroot Valley, (2) the Bitterroot Range, attaining an elevation of some 11,000 feet, and merging westward into (3) the great, dissected, high plateau of the Clearwater Mountains, and still farther westward (4) the Columbia River lava plateau, to which the Clearwater plateau descends rather abruptly. In this great plateau such streams as the Salmon, Clearwater, and Snake are deeply incised.

The geology is fairly simple, according to Mr. Lindgren's statement. The main Bitterroot Range is a quartz-monzonite mass, the northward continuation of the central Idaho bathylith. This is an intrusive mass of probably post-Carboniferous age.

The eastern slope of the range is a fault plane that dips about 18° to the east. The rocks of the fault zone are both gneissic and schistose. In addition to these igneous and metamorphic rocks, there are areas of sedimentaries, quartzites, and slates, supposed to be of Cambrian or pre-Cambrian age. Into this series the granite is found to have quite extensively intruded. Other areas of sedimentaries, supposed extensions of the Seven Devils' series, are presumably Mesozoic. The granite of the Clearwater Mountains is intrusive into these in many places. These sedimentaries are confined, as a rule, to the flanks of the central granite mass, which is the prevailing rock in both the Bitterroot and Clearwater Mountains.

The Columbia River plateau is formed of essentially horizontal lava flows, in which are intercalated shallow water deposits which contain Miocene plant remains. In the discussion of the lava flows, Mr. Lindgren mentions some interesting facts that go to show the existence of differential uplifts and subsidence in the plateau region.

Glaciation, whose effects are to be seen down to about 4,000 feet in some places, is also given some considerable mention. This must have been one of the most extensively glaciated regions in the whole Cordilleran system

From an economic standpoint this district has not yet proved a dangerous rival of its sister regions farther north in the Cœur d'Alène Mountains. The valuable minerals are chiefly confined to the western slope of the Clearwater Mountains. Gold, in fissure veins and gravels, is the most important mineral. Some few prospects of copper, silver, and silver-lead ores have been worked. Elk City is the chief center of the mining industry of the region.

Some fair coal of a lignitic character, and of probably Tertiary age, has been discovered, but may not prove profitable on account of the thinness of the beds. This lignite is found in two rather remarkable associations. In one case the lignite is interbedded with rhyolitic flows, and in the other in a series of sediments intercalated in the Columbia River basaltic flows.

It is evident that this region, because of its great extent and rugged character could merely be skimmed over in a reconnaissance, and, doubtless, much of interest yet awaits the scientist and practical miner.

W. D. S.

"A New Marine Reptile from The Trias of California," *University of California Publications*, Vol. III, (1904), pp. 419–21.

Among the recent discoveries in vertebrate paleontology, none is of greater interest than that by Dr. Merriam of a new order of marine reptiles to which he has given the name Thalattosauria, from the typical genus *Thalattosaurus* Merriam, from the Upper Trias of California. This new order presents many of the peculiar aquatic adaptations of other well-known, marine saurians, though differing markedly in structure. The skull is elongate; the vomers (prevomers) and pterygoids are covered with flat, button-like teeth, primitive characters lost in all other marine reptiles, save the pterygoid teeth of the mosasaurs; the dorsal ribs are single-headed; and the bones of the limbs are short, though the pelvis is robust, indicating, either incomplete aquatic adaptation, or a short non-propelling tail. The order is related, the author thinks, more to the early rhynchocephaloid reptiles than to the ichthyosaurs. Further information concerning these strange reptiles will be awaited with interest.

S. W. W.

"Neue Zeuglodonten aus dem unteren Mitteleocen vom Mokattam bei Cairo," *Geologisch-Paläontologische Abhandlungen*, Vol. VI (1904), p. 199.

A startling suggestion as to the origin of the Zeuglodon "whales" is that given by Professor Fraas in a recent paper on the Zeuglodonts from